

## Preliminary Checks

Several of the diagnostic procedures call for the completion of a Visual / Physical Checklist. The importance of this step cannot be stressed strongly enough. It can lead to correcting a problem without further checks and can save valuable time. This check is outlined below:

### Visual / Physical Checklist

| Step | Action                                                                                                                        | Yes                                      | No                                                                 |
|------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------------------------------------------------------|
| 1.   | Is the battery fully charged?                                                                                                 | Go to Step 2.                            | Replace battery.<br>Restart checklist.                             |
| 2.   | Are the battery cable connections clean and tight?                                                                            | Go to Step 3.                            | Clean or tighten battery cable connections. Go to Step 3.          |
| 3.   | Are the external engine grounds tight and clean?                                                                              | Go to Step 4.                            | Clean or tighten engine grounds.<br>Go to Step 4.                  |
| 4.   | Check fuel line and fuel line connections for leaks, corrosion and blockage. Was a problem found?                             | Repair problem.<br>Go to Step 5.         | Go to Step 5.                                                      |
| 5.   | Check the 4 fuses located next to the ECM on the engine. Are the fuses good?                                                  | Go to Step 6.                            | Replace fuse.<br>Go to Step 6.                                     |
| 6.   | Check the 50-amp circuit breaker located on the engine to ensure that the circuit is closed. Was the circuit breaker tripped? | Reset the circuit breaker. Go to Step 7. | Go to Step 7.                                                      |
| 7.   | Is the lanyard stop switch in the wrong position?                                                                             | Toggle switch. Go to Step 8.             | Go to Step 8.                                                      |
| 8.   | Are you using the correct version of scan tool software for the engine in question?                                           | Go to OBD System Chart.                  | Obtain appropriate version of software.<br>Go to OBD System Chart. |

On-Board Diagnostic (OBD) System Chart

| Step | Action                                                                                                                                                                                           | Yes                                           | No                                                                                              |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1    | Was the Visual / Physical Checklist completed?                                                                                                                                                   | Go to Step 2.                                 | Go to Visual / Physical Checklist.                                                              |
| 2    | Connect scan tool to the engine. Ignition ON. Is the scan tool communicating with the ECM?                                                                                                       | Go to Step 10.                                | Go to Step 3                                                                                    |
| 3    | Ignition ON.<br>Check for battery voltage (B+) at Pin 5 of the 10-pin connector or Pin 3 of the 14-pin connector coming from the helm.<br>Ignition OFF.<br>With the ignition ON, was B+ present? | Go to Step 4.                                 | Locate and repair problem from the keyswitch to the engine 10-pin connector.<br>Re-test system. |
| 4    | Ignition ON.<br>Check for B+ at PCM Connector A-1. Ignition OFF.<br>With the ignition ON, was B+ present?                                                                                        | Go to Step 6.                                 | Go to Step 5                                                                                    |
| 5    | Check for continuity between Pin 5 of the 10-pin Connector of the engine harness and ECM Connector B-18. Was continuity present?                                                                 | Go to Step 6.                                 | Locate and repair the open in the harness.<br>Re-test system.                                   |
| 6    | Ignition ON.<br>Check for B+ at Diagnostic connector Pin D.<br>Ignition OFF.<br>With the ignition ON, was B+ present?                                                                            | Go to Step 7.                                 | Repair or replace harness.<br>Re-test system.                                                   |
| 7    | Check continuity of the ground wire, Diagnostic connector Pin A and Pin 1 of the 10-pin or Pin C of the 14-pin Connector .<br>Was continuity present?                                            | Go to Step 8.                                 | Locate and repair the open in the harness.<br>Re-test system.                                   |
| 8    | Check continuity between Diagnostic connector Pin B and ECM connector A-12. Was continuity present?                                                                                              | Go to Step 9.                                 | Locate and repair the open in the harness.<br>Re-test system.                                   |
| 9    | Check continuity between Diagnostic connector Pin C and ECM connector A-5. Was continuity present?                                                                                               | Replace ECM.                                  | Locate and repair the open in the harness.<br>Re-test system.                                   |
| 10   | Using the scan tool, check for faults stored in the ECM. Were any faults present?                                                                                                                | Inspect. and repair fault.<br>Re-test system. | Go to appropriate symptom chart.                                                                |

## Symptom Charts

The following symptom charts provide the mechanic a quick method of finding the possible cause of a problem.

|                             |              |
|-----------------------------|--------------|
| DMT 2004 Digital Multimeter | 91-892647A01 |
|-----------------------------|--------------|

**Chart A-1 Engine Cranks Over but Will Not Start**

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                              | Yes                               | No                                       |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------------------------|
| 1.   | <b>Was the Visual and Physical Checklist completed?</b>                                                                                                                                                                                                                                                                                                                                                                                             | Go to step 2.                     | Go to the Visual and Physical Checklist. |
| 2.   | <b>Was the On-Board Diagnostic (OBD) System Check performed?</b>                                                                                                                                                                                                                                                                                                                                                                                    | Go to step 3.                     | Go to the OBD Chart.                     |
| 3.   | Check for adequate spark at all of the spark plugs.<br><b>Was adequate spark present?</b>                                                                                                                                                                                                                                                                                                                                                           | Go to step 4.                     | Go to Chart A-2.                         |
| 4.   | Disconnect both battery cables from the battery. Install fuel pressure gauge. Connect the battery cables to the battery. Turn ignition to "ON." Fuel pump will operate for 3–5 seconds. Note the fuel pressure while the pump is operating. The pressure may drop after the pump stops, but should not drop immediately to 0 kPa (0 PSI). Turn ignition to "OFF."<br><b>Was the fuel pressure within specification when the pump was operating?</b> | Go to step 5.                     | Go to Chart A-3.                         |
| 5.   | Complete a compression test on the engine. See compression test procedures.<br><b>Was a problem found?</b>                                                                                                                                                                                                                                                                                                                                          | Locate and repair. Retest system. | Go to the OBD Chart.                     |

## Chart A-2 Main Power Relay Test

| Step | Action                                                                                                                                                                                                                | Yes                                                         | No                                                                    |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------|
| 1.   | <b>Was the Visual and Physical Checklist completed?</b>                                                                                                                                                               | Go to step 2.                                               | Go to Visual and Physical Checklist.                                  |
| 2.   | <b>Was the On-Board Diagnostic (OBD) System Check performed?</b>                                                                                                                                                      | Go to step 3.                                               | Go to the OBD Chart.                                                  |
| 3.   | Turn ignition to "ON."<br>Listen for the Main Power Relay (MPR).<br>Turn ignition to "OFF."<br><br><b>With initial ignition ON, did the Main Power Relay turn on (should hear a click)?</b>                           | Go to Chart A-5.                                            | Go to step 4.                                                         |
| 4.   | Remove the MPR.<br>Turn ignition to "ON."<br>Using the DMT connected to ground, check for B+ MPR harness connector terminal 30 and 86.<br>Turn ignition to "OFF."<br><br><b>With the ignition ON, was B+ present?</b> | Go to step 5.                                               | Locate and repair the open or short in the harness. Retest system.    |
| 5.   | Check for continuity between the MPR harness connector terminal 85 and the ECM harness connector A-22.<br><br><b>Was continuity present?</b>                                                                          | Install a known good MPR onto the engine.<br>Retest system. | Locate and repair the open or short in the harness.<br>Retest system. |

## Chart A-3 Fuel System Electrical Test

| Step | Action                                                                                                                                                                                                                          | Yes                                            | No                                                                    |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------|
| 1.   | <b>Was the Visual and Physical Checklist completed?</b>                                                                                                                                                                         | Go to step 2.                                  | Go to the Visual and Physical Checklist.                              |
| 2.   | <b>Was the On-Board Diagnostic (OBD) System Check performed?</b>                                                                                                                                                                | Go to step 3.                                  | Complete the OBD.                                                     |
| 3.   | Turn ignition to "ON."<br>Listen for the fuel pump to operate.<br>Turn ignition to "ON."<br><br><b>Did the fuel pump operate for 3–5 seconds?</b>                                                                               | Go to Chart A-4.                               | Go to step 4.                                                         |
| 4.   | Turn ignition to "ON."<br>Using the DMT connected to ground, check for B+ at the fuel pump harness connector A.<br>Turn ignition to "ON."<br><br><b>With the ignition ON, was B+ present?</b>                                   | Install a known good fuel pump. Retest system. | Go to step 5.                                                         |
| 5.   | Remove fuel pump relay (FPR).<br>Turn ignition to "ON."<br>Using the DMT connected to ground, check for B+ at FPR harness connector terminal 30.<br>Turn ignition to "OFF."<br><br><b>With the ignition ON, was B+ present?</b> | Go to step 6.                                  | Locate and repair the open or short in the harness.<br>Retest system. |
| 6.   | Check for continuity between FPR harness connector terminal 86 and ECM harness connector A-19.<br><br><b>Was continuity present?</b>                                                                                            | Install a known good FPR.<br>Retest system.    | Locate and repair the open or short in the harness.<br>Retest system. |

## Chart A-4 Fuel System Diagnosis

Before starting fuel system diagnosis, verify that fuel is in the tank.

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Yes                                                                            | No                                                        |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------|
| 1.   | <b>Was the Visual and Physical Checklist completed?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Go to step 2.                                                                  | Go to the Visual and Physical Checklist.                  |
| 2.   | <b>Was the On-Board Diagnostic (OBD) System Check performed?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Go to step 3.                                                                  | Complete the OBD.                                         |
| 3.   | <p>Disconnect both battery cables from the battery.<br/>                     Install fuel pressure gauge.<br/>                     Connect the battery cables to the battery.<br/>                     Turn ignition to "ON."<br/>                     Fuel pump will operate for 3–5 seconds. Note the fuel pressure while the pump is operating. The pressure may drop after the pump stops, but should not drop immediately to 0 kPa (0 PSI).<br/>                     Turn ignition to "OFF."</p> <p><b>Was the fuel pressure within specification when the pump was operating?</b></p> | Go to step 4.                                                                  | Go to step 6.                                             |
| 4.   | <p>Attempt to start the engine and idle at normal operating temperatures.</p> <p><b>Did the engine start?</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Go to step 5.                                                                  | Go to step 7.                                             |
| 5.   | <p>With the engine idling, connect an external vacuum source to the fuel pressure regulator and apply 34 kPa (10 in. )Hg of vacuum.</p> <p><b>Did fuel pressure decrease by approximately 34.5 kPa (5 PSI)?</b></p>                                                                                                                                                                                                                                                                                                                                                                         | Problem is intermittent or the fuel supply to the engine is low or restricted. | Replace faulty fuel pressure regulator.<br>Retest system. |
| 6.   | <b>Was fuel pressure present?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Go to step 7.                                                                  | Go to Chart A-3.                                          |
| 7.   | <b>Does the system establish fuel pressure and then quickly decrease to 0 kPa (0 PSI)?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Go to step 8.                                                                  | Retest system                                             |
| 8.   | <p>Turn ignition to "OFF."<br/>                     Block fuel pressure line between the fuel pump and the fuel rail.<br/>                     Turn ignition to "ON."</p> <p><b>Does fuel pressure remain steady?</b></p>                                                                                                                                                                                                                                                                                                                                                                   | Locate and repair leaking fuel injectors or fuel line connections.             | Go to step 9.                                             |
| 9.   | <p>Turn ignition to "OFF."<br/>                     Block fuel return line using the fuel shut off valve tool.<br/>                     Turn ignition to "ON."</p> <p><b>Does fuel pressure remain steady?</b></p>                                                                                                                                                                                                                                                                                                                                                                          | Replace faulty fuel pressure regulator.<br>Retest system.                      | Install a known good fuel pump.<br>Retest system.         |

## Chart A-5 Ignition System Test

| Step | Action                                                                                                                                                                                                                                       | Yes                                             | No                                                                                                                        |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| 1.   | <b>Was the Visual and Physical Checklist completed?</b>                                                                                                                                                                                      | Go to step 2.                                   | Go to the Visual and Physical Checklist.                                                                                  |
| 2.   | <b>Was the On-Board Diagnostic (OBD) System Check performed?</b>                                                                                                                                                                             | Go to step 3.                                   | Complete the OBD.                                                                                                         |
| 3.   | Install an analog tachometer to the auxiliary tachometer lead located near the PCM.<br>Try to start the engine.<br>Turn ignition to "OFF."<br><br><b>Was there any tachometer signal on the analog tachometer while cranking the engine?</b> | Go to step 4.                                   | Confirm tachlink configured correctly.<br>Engine mechanical problem, go to appropriate Mercury MerCruiser service manual. |
| 4.   | Check spark plug wires for open circuits, cracks in the insulation or improper seating of the terminals at the spark plugs, distributor cap, and coil tower.<br><br><b>Was a problem found?</b>                                              | Locate and repair or replace.<br>Retest system. | Go to step 5.                                                                                                             |
| 5.   | Check for adequate spark at all of the spark plugs. <b>Was adequate spark present?</b>                                                                                                                                                       | Go to step 6.                                   | Go to step 7.                                                                                                             |
| 6.   | Check spark plugs for damage and wear.<br><br><b>Was a problem found?</b>                                                                                                                                                                    | Replace with a new spark plug gapped correctly. | Go to step 12.                                                                                                            |
| 7.   | Turn ignition to "ON."<br>Using the DMT, check for B+ at the coil connector A on 5.0L, 5.7L, and 6.2L, or on connector H on the 8.1L/496 cid.<br>Turn ignition to "OFF."<br><br><b>With the ignition ON, was B+ present?</b>                 | Go to step 8.                                   | Locate and repair the open in the harness.<br>Retest system.                                                              |
| 8.   | Check for continuity between the coil harness connectors B and C, and the coil driver harness connector D on 5.0L, 5.7L, and 6.2L engines.<br><br><b>Was continuity present?</b>                                                             | Go to step 9.                                   | Locate and repair the open in the harness.<br>Retest system.                                                              |
| 9.   | Turn ignition to "ON."<br>Using DMT, check for B+ at coil driver harness connector A on 5.0L, 5.7L, and 6.2L engines.<br>Turn ignition to "OFF."<br><br><b>With the ignition ON, was B+ present?</b>                                         | Go to step 10.                                  | Locate and repair the open in the harness.<br>Retest system.                                                              |

| Step | Action                                                                                                                                                                                                                                                                  | Yes                                                 | No                                                           |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------|
| 10.  | Check continuity between the coil driver harness connector C and the engine ground on 5.0L, 5.7L, and 6.2L engines.<br><br><b>Was continuity present?</b>                                                                                                               | Go to step 11.                                      | Locate and repair the open in the harness.<br>Retest system. |
| 11.  | Check continuity between the coil driver harness connector B and the ECM connector B-23 on 5.0L, 5.7L, and 6.2L engines.<br><br><b>Was continuity present?</b>                                                                                                          | Replace the coil and coil driver.<br>Retest system. | Locate and repair the open in the harness.<br>Retest system. |
| 12.  | Disconnect the harness from the Crankshaft position sensor (CPS).<br>Turn ignition to "ON."<br>Using a DMT connected to ground, check for 5-volt power at harness connector A.<br>Turn ignition to "OFF."<br><br><b>With the ignition ON, was 5-volt power present?</b> | Go to step 13.                                      | Locate and repair the open in the harness.<br>Retest system. |
| 13.  | Check continuity between CPS harness connector B and engine ground.<br><br><b>Was continuity present?</b>                                                                                                                                                               | Go to step 14.                                      | Locate and repair the open in the harness.<br>Retest system. |
| 14.  | Check continuity between CPS harness connector C and ECM harness connector B-10 on 5.0L, 5.7L, and 6.2L engines.<br><br><b>Was continuity present?</b>                                                                                                                  | Go to step 15.                                      | Locate and repair the open in the harness.<br>Retest system. |

### Chart A-6 Hard Start Symptom

Definition: Engine cranks, but takes a long time to start.

| Step | Action                                                                                                                                                                                 | Yes                                           | No                                       |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------|
| 1.   | <b>Was the Visual and Physical Checklist completed?</b>                                                                                                                                | Go to step 2.                                 | Go to the Visual and Physical Checklist. |
| 2.   | <b>Was the On-Board Diagnostic (OBD) System Check performed?</b>                                                                                                                       | Go to step 3.                                 | Complete the OBD.                        |
| 3.   | Check for contaminated fuel.<br>Check fuel filters and the water-separating fuel filter.<br>Check for poor fuel quality and improper octane rating.<br><br><b>Was a problem found?</b> | Use known good fuel.<br>Replace fuel filters. | Go to step 4                             |
| 4.   | Check for adequate spark at all of the spark plugs.<br><br><b>Was adequate spark present?</b>                                                                                          | Go to step 5.                                 | Go to Chart A-2.                         |